

forms which I have considered in my memoir on the Calculus of Functions published in the Philosophical Transactions for 1862, in which the general solution of the equations

$$\phi(x) - \chi(x)\phi\left\{\frac{a+bx}{c+ex}\right\} = F(x),$$

where  $\phi$  is the unknown function, has been obtained.

#### COMMUNICATIONS RECEIVED SINCE THE END OF THE SESSION.

- I. "Comparison of Mr. De la Rue's and Padre Secchi's Eclipse Photographs." By WARREN DE LA RUE, F.R.S. Received August 8, 1864.

I have stated, in the Bakerian Lecture read at the Royal Society on April 10, 1862, that the boomerang (prominence E)\* was not depicted on Señor Aguilar's photographs. This is true of the prints which came into my hands in England. A visit to Rome in November 1862, however, afforded an opportunity for the examination of the first prints which had been taken in Spain on the day of the eclipse, previous to those printed off for general distribution by Señor Aguilar. I was agreeably surprised to find that the photograph of the first phase of totality showed not only this prominence very distinctly, but also other details, presently to be described, which were quite invisible in Señor Aguilar's copies. I had in fact experienced some difficulty in comparing measurements of my photographs with those of Señor Aguilar's, on account of the indistinctness (woolliness) of the latter, which I have attributed to Padre Secchi's telescope not having followed the sun's motion perfectly. A careful examination of the prints in Padre Secchi's possession has, however, convinced me that this was not the case during the period of exposure of the first negative; for I have been able to identify with a magnifier many minute forms which could only have been depicted by the most perfect following of the sun's apparent motion. For instance, my statement that the prominence H (the fallen tree) was not seen from having been mixed up with the prominence G, is not applicable to Padre Secchi's copy of the first phase of totality, for in it every detail of the fallen tree can be made out.

On expressing to Professor Secchi my surprise at the great discordance between the copy of the first phase of totality sent to me by Señor Aguilar and that of the same phase in his possession, I was informed that after a few positive prints had been taken from the then unvarnished negative, it was strengthened by the usual photographic process with nitrate of silver. This I look upon as an unfortunate mistake, as the images of the prominences were increased and their details hidden, and the beauty of the negative for ever lost.

It occurred to Padre Secchi and myself that although there was no hope

\* See Index Map, Plate XV. Phil. Trans. Part I. 1862.

of procuring more satisfactory prints from the original negative of the first phase of totality, yet some advantage would arise from taking an enlarged negative from the positive print in his possession, although it could not be expected to yield as perfect an impression as might have been obtained by enlarging from the original photograph. The enlargement has been successfully accomplished in my presence; and although Professor Secchi will take such means as he may think proper to make known the results of comparisons he may make between my photographs and his own, it will not be out of place for me to add a few remarks by way of appendix to my paper.

Taking the prominences in the order in my index map, Plate XV. :—

Prominence A (the cauliflower or wheatsheaf) has the same form in Padre Secchi's photograph as in mine. It extends considerably less in height above the moon's edge in this copy than in that printed off from the strengthened negative (Señor Aguilar's copy); the bright points of the two branching streams which issue from the summit towards the North are well depicted in the Secchi photograph, but not the fainter parts.

There exists a faint indication of the minute prominence B in the S. photograph.

The convolutions of the prominence C (the floating cloud) are seen in the S. photograph, and its form coincides absolutely with that of mine; it is a little nearer the moon's edge at the point *c*, probably because the telescope was uncovered relatively a little later than at Rivabellosa.

The prominence D cannot be clearly traced in the S. photograph.

The boomerang E is distinctly visible in the S. photograph; the point *e* is apparently prolonged; but this I attribute to an accidental photographic stain, for the bright part *e'* can be well made out.

The long prominence F cannot be made out in the S. photograph, probably from the cause explained in reference to C.

The fallen tree (H in the S. photograph) corresponds in its minutest details with its picture in my own. The articulated extremity *h*, the round points *h' h''*, the point *h'''*, and the connecting branch joining it with the stem are clearly seen.

The prominence G from *g<sub>1</sub>* to *g'* corresponds precisely in the S. photograph with its image in my own, and a dark marking near *g* also is seen; the narrow portion of this prominence, from *g* to the point immediately below *h*, is not seen in the S. photograph.

The prominence I (the mitre) agrees in form in the S. photograph with its image in my own, even the faint point *i* is there seen. This prominence in the S. photograph extends further from the edge of the moon than in mine; and whereas in my photograph the convex boundary next the moon is cut off by the moon's limb, in Padre Secchi's the convex boundary is complete, and hence in all probability the prominence I presented another case of a floating cloud.

About midway between G and I there is a small round prominence visi-

ble in the S. photograph not seen in mine, which may be accounted for from our different positions in respect to the central line of the eclipse.

Between I and K, at a distance from I equal to about two-thirds the angular interval, there is in the S. photograph a prominence consisting of two round dots, which extend beyond the moon's limb to precisely the same extent as the prominence K protrudes in Professor Secchi's photograph beyond the moon's limb in excess of what it does in my own.

The prominence K has precisely the same form in every respect in the S. photograph as in mine, so far as mine shows it; but on account of parallax, more of it is seen in the S. photograph than in mine.

Beyond K is another prominence, visible in the S. photograph about  $17^{\circ}$  distant from K, a small round prominence which could not have been visible from my station.

Of the remaining prominences, L, M, N, O, P, Q, R, none were visible at the epoch of the photograph.

In conclusion, the photographic images of the prominences, so far as they are common to the two photographs taken at Miranda and Desierto de las Palmas, accord in their most minute details. The photographs must, from the difference of position of the two stations, have been made at an absolute interval of about seven minutes; and this fact, while it strongly supports the conclusion that the protuberances belong to the sun, at the same time shows that there is no change in their form during an interval much greater than the whole duration of an eclipse.

## II. "On Drops." By FREDERICK GUTHRIE, Esq., Professor of Chemistry and Physics at the Royal College, Mauritius. Communicated by Professor STOKES, Sec. R.S. Received July 15, 1864.

In the following investigation, the word drop is used in a rather more definite sense than that which is usually attached to it.

In common speech a drop signifies any mass of liquid matter whose form is visibly influenced towards the spherical by the attraction of its parts, and whose sensible motion or tendency is towards the earth. This definition both includes drops with which we are not here concerned, and excludes others which we shall have to consider; for we shall have to measure the size of drops; and it can only be of avail to measure the size of such drops as are formed under fixed and determinable conditions.

How many drops, according to the usual scope of the term, are formed under indefinite conditions. For instance, a rain-drop depends for its size upon such circumstances as the quantity of vapour at the time and place of its formation, the tranquillity and electrical condition of the air, its rate of motion, the number and size of the drops it meets with in its course, &c., all of which are fortuitous, or, at least, immeasurable conditions.

With such drops we have here nothing to do, but only with those which are formed under fixed circumstances. On the other hand, we